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EXAMINER

CHACKO DAVIS, DABORAH

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1756

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/675,419
Filing Date: September 30, 2003
Appellant(s): KULP, JOHN M.

MAILED

GROUP 1700

Kristi L. Davidson
For Appellant

EXAMINER'S ANSWER

MAILED

OCT 01 2007
GROUP 1700

This is in response to the appeal brief filed June 7, 2007, appealing from the Office action mailed October 11, 2006.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The amendment after final rejection filed on February 9, 2007, has not been entered.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,472,127	Takizawa	10-2002
6,136,514	Phan et al., hereinafter referred to as Phan	10-2000
5,845,170	Ogata	12-1998
US Patent Application	Hayasaki et al., hereinafter	02-2004
Publication 2004/0029026	referred to as Hayasaki	
US patent Application	Maemori et al., hereinafter	05-2002
Publication 2002/0058202	referred to as Maemori	

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 3, 11, 14, 17, and 19, are rejected under 35 U.S.C. 102(e) as being anticipated by U. S. Patent No. 6,472,127 (Takizawa).

Takizawa, in the abstract, in col 5, lines 56-67, in col 6, lines 8-10, and lines 26-

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36, in col 7, lines 1-17, disclose a method for developing a resist film formed on a substrate wherein an aqueous solution of a surfactant is applied onto the photoresist film, followed by displacing the surfactant film formed by applying the developing solvent of a predetermined concentration on the photoresist film to develop the photoresist film (claim 1). Takizawa, in col 9, lines 40-46, in col 10, lines 20, in col 11, lines 5-10, discloses that the surfactant employed includes anionic surfactants, cationic surfactants, and nonionic surfactants (claim 3). Takizawa, in col 6, lines 32-45, and in figure 7, discloses that the substrate is rotated during the application of the surfactant solution (spin coating the surfactant solution) onto the photoresist film, wherein the solution of the surfactant is supplied onto the resist surface via a cylindrically-shaped nozzle, and depositing the surfactant in a circular shaped manner (see figure 7) on the resist film, said nozzle positioned over the center of the substrate (substrate rotated while being deposited with the aqueous surfactant solution) (claim 11). Takizawa, in col 6, lines 37-55, in col 7, lines 7-20, and in figure 12, discloses that the surfactant is spin coated in a drop-wise manner onto the center portion of the resist coated substrate, followed by spin coating the developing solution (displacing the surfactant) via a cylindrically-shaped nozzle onto the center of the rotating substrate (resist film treated with surfactant) wherein the developing solvent is sprayed in a circular manner (see figure 12) for a predetermined time so as to cause the developing solvent component to be reattached to the surface of the photoresist film (claims 14, 17, and 19).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 4-5, 9-10, and 18, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,472,127 (Takizawa) in view of U. S. Patent No. 6,136,514 (Phan et al., hereinafter referred to as Phan).

Takizawa is discussed in paragraph no. 6.

Takizawa discloses that the surfactant solution applied on the resist hydrophilicizes the exposed resist and thereby reduces the contact angle of the developing solution on the resist film (claim 5). Takizawa, in col 6, lines 45-67, in col 7, lines 1-20, discloses that exposure of the resist film results in exposed and unexposed portions of the resist having a difference in the solubility (claim 9).

The difference between the claims and Takizawa is that Takizawa does not disclose determining the concentration for the surfactant solution based on one or more characteristics of the resist film (claim 2). Takizawa does not disclose determining the concentration of the surfactant solution based on the resist film, and selecting the concentration of the developing solution based on one or more characteristics of the surfactant solution (claim 4). Takizawa does not disclose determining the concentration of the surfactant solution based on the contact angle, solubility of the exposed portions and unexposed portions of the resist. Takizawa does not disclose that the

concentration of the surfactant is based on the water solubility of the resist film (claim 10). Takizawa does not disclose that the concentration of the developing solution is selected based on characteristics of the surfactant and the resist film (claim 18).

Phan, in col 2, lines 10-45, in col 3, lines 27-67, discloses that the concentration of the surfactant solution (resist activating solution) is based the characteristics of the resist film and the water solubility of the resist film. Phan, in col 4, lines 1-22, in col 5, lines 46-67, in col 6, lines 1-7, discloses that concentration of the developing solution is based on the resist film characteristics and the resist activating solution properties.

Therefore, it would be obvious to a skilled artisan to modify Takizawa by employing the concentrations of surfactants and developing solutions suggested by Phan because Phan, in col 3, lines 28-59, discloses that the resist activating solution promotes the reduction of the surface tension of the developer, promotes hydrophilicity of the resist film and thereby reduces contact angle, prevents the formation of micro bubbles during development.

5. Claims 6-8, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,472,127 (Takizawa) in view of U. S. Patent 5,845,170 (Ogata).

Takizawa is discussed in paragraph no. 6.

Takizawa, in col 6, lines 10-56, in col 7, lines 1-24, discloses positioning the resist coated film substrate on a support plate in a developing unit, wherein the supporting plate (spin chuck) is rotatably driven by a motor, applying and displacing the surfactant and developer respectively on the surface of the resist while substrate is rotated, and developing the resist film by applying the developing solution for a

predetermined time (reattachment of the developing solvent component to the surface of the photoresist film) (claims 6-7).

The difference between the claims and Takizawa is that Takizawa does not disclose that the resist-coated substrate is transferred to the developing unit. Takizawa does not disclose rinsing and drying the substrate while rotating the spin chuck and transferring the substrate out of the developing unit (claim 8).

Ogata, in col 4, lines 57-67, in col 5, lines 30-37, in col 7, lines 61-67, discloses that the resist coated wafer is transferred to a developing unit. Ogata, in col 10, lines 6-36, discloses that after the developing process the wafer (rotated at a high speed) is rinsed with a cleaning solution followed by drying, and then releasing the wafer from the developing unit (carry out the wafer, reference S19 of figure 8).

Therefore, it would be obvious to a skilled artisan to modify Takizawa by employing the resist coating and developing system suggested by Ogata because Ogata, in col 4, lines 56-67, in col 7, lines 61-66, and in figure 2, discloses that the resist coated substrate is transferred to a developing unit and are communicable with each other via a vertical flow system, thereby enabling an increased efficient cleanness of each part in the system. It would be obvious to a skilled artisan to modify Takizawa by employing the rinse process suggested by Ogata because Ogata, in col 10, lines 10-36, discloses that rinsing the developed wafer, while the wafer is rotated at high speed (S16) ensures the complete removal of the developing solution from the wafer surface.

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6. Claims 12-13, 15-16, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. patent No. 6,472,127 (Takizawa) in view of U. S. Patent Application Publication No. 2004/0029026 (Hayasaki et al., hereinafter referred to as Hayasaki).

Takizawa is discussed in paragraph no. 6.

Takizawa, in col 6, lines 37-55, in col 7, lines 7-20, and in figure 12, discloses that the surfactant is spin coated via a nozzle onto the surface of the resist-coated substrate, followed by spin coating the developing solution (displacing the surfactant) via nozzle onto the surface of the rotating substrate (resist film treated with surfactant) wherein the developing solvent (of predetermined concentration, adjusted concentration) is sprayed in a circular manner (see figure 12) for a predetermined time so as to cause the developing solvent component to be reattached to the surface of the photoresist film (claims 12-13, and 15-16).

The difference between the claims and Takizawa is that Takizawa does not disclose that the nozzle used for dispensing either the surfactant or the developing solution includes a plurality of nozzles that dispenses the corresponding fluid in a substantially band shape, wherein the nozzles are scanned over the substrate while depositing the corresponding fluid.

Hayasaki, in [0056], [0057], [0058], [0061], [0065], [0068], [0069], and in figures 2, and 4, discloses the use of a rectangular shaped nozzle that includes a plurality of nozzle discharge ports and dispenses solutions (of predetermined concentration) in a band shape in a direction vertical (onto the surface of the substrate) to the nozzle scan direction.

Therefore, it would be obvious to a skilled artisan to modify Takizawa by employing a plurality of nozzles of the claimed geometry as suggested by Hayasaki because Hayasaki, in [0056], and [0057], discloses that such a nozzle arrangement enables a series of processes (treating, developing, cleaning etc) to be performed, is moveable vertically and horizontally to discharge a fluid while scanning the substrate, and dispenses the fluid in a uniform amount on the surface of the substrate.

7. Claims 20-21, 23-25, 28, 31, and 34-35, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,472,127 (Takizawa) in view of U. S. Patent No. 6,136,514 (Phan et al., hereinafter referred to as Phan).

Takizawa, in the abstract, in col 5, lines 56-67, in col 6, lines 8-10, and lines 26-36, in col 7, lines 1-17, disclose a method for developing a resist film formed on a substrate wherein an aqueous solution of a surfactant is applied onto the photoresist film, followed by displacing the surfactant film formed by applying the developing solvent of a predetermined concentration on the photoresist film to develop the photoresist film. (claim 20). Takizawa, in col 9, lines 40-46, in col 10, lines 20, in col 11, lines 5-10, discloses that the surfactant employed includes anionic surfactants, cationic surfactants, and nonionic surfactants (claim 21). Takizawa discloses that the surfactant solution applied on the resist hydrophilicizes the exposed resist and thereby reduces the contact angle of the developing solution on the resist film (claim 25). Takizawa, in col 6, lines 32-45, and in figure 7, discloses that the substrate is rotated during the application of the surfactant solution (spin coating the surfactant solution) onto the photoresist film, wherein the solution of the surfactant is supplied onto the resist surface via a

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cylindrically-shaped nozzle, and depositing the surfactant in a circular shaped manner (see figure 7) on the resist film, said nozzle positioned over the center of the substrate (substrate rotated while being deposited with the aqueous surfactant solution) (claim 28). Takizawa, in col 6, lines 37-55, in col 7, lines 7-20, and in figure 12, discloses that the surfactant is spin coated in a drop-wise manner onto the center portion of the resist coated substrate, followed by spin coating the developing solution (displacing the surfactant) via a cylindrically-shaped nozzle onto the center of the rotating substrate (resist film treated with surfactant) wherein the developing solvent is sprayed in a circular manner (see figure 12) for a predetermined time so as to cause the developing solvent component to be reattached to the surface of the photoresist film (claims 31, 34, and 35).

The difference between the claims and Takizawa is that Takizawa does not disclose determining the concentration for the surfactant solution based on one or more characteristics of the resist film. Takizawa does not disclose that the concentration of the developing solution is selected based on characteristics of the surfactant and the resist film. Takizawa does not disclose determining the concentration of the surfactant solution based on the resist film, and selecting the concentration of the developing solution based on the surfactant solution concentration (claim 23). Takizawa does not disclose determining the concentration of the surfactant solution based on the contact angle, solubility of the exposed portions and unexposed portions of the resist. Takizawa does not disclose that the concentration of the surfactant is based on the water solubility of the resist film (claim 24).

Phan, in col 2, lines 10-45, in col 3, lines 27-67, discloses that the concentration of the surfactant solution (resist activating solution) is based the characteristics of the resist film and the water solubility of the resist film. Phan, in col 4, lines 1-22, in col 5, lines 46-67, in col 6, lines 1-7, discloses that concentration of the developing solution is based on the resist film characteristics and the resist activating solution properties (including the concentration of the resist activating solution). Phan in col 6, lines 6-14, discloses rinsing the substrate surface after the development process.

Therefore, it would be obvious to a skilled artisan to modify Takizawa by employing the concentrations of surfactants and developing solutions suggested by Phan because Phan, in col 3, lines 28-59, discloses that the resist activating solution promotes the reduction of the surface tension of the developer, promotes hydrophilicity of the resist film and thereby reduces contact angle, prevents the formation of micro bubbles during development. It would be obvious to a skilled artisan to modify Takizawa by employing the rinsing process suggested by Phan because Phan, in col 6, lines 5-15, discloses that the rinsing process enables the removal of all resist residues and developing solution remaining on the substrate surface.

8. Claim 22, is rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,472,127 (Takizawa) in view of U. S. Patent No. 6,136,514 (Phan et al., hereinafter referred to as Phan) as applied to claims 20-21, 23-25, 28, 31, and 34-35 above, and further in view of U. S. Patent Application Publication No. 2002/0058202 (Maemori et al., hereinafter referred to as Maemori).

Takizawa in view of Phan is discussed in paragraph no. 11.

The difference between the claims and Takizawa in view of Phan is that Takizawa in view of Phan does not disclose determining the concentration of the surfactant solution based on the resist film thickness (claim 22).

Maemori, in the abstract, in [0039], and [0042], discloses that the surfactant concentration is determined based on the resist film thickness formed on the substrate.

Therefore, it would be obvious to a skilled artisan to modify Takizawa in view of Phan by determining surfactant concentration based on the resist thickness as suggested by Maemori because Maemori in [0042], discloses that doing so ensures good uniformity of the coating layer formed on the substrate surface and reduces considerably the defects in the finely patterned resist after development.

9. Claims 26-27, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. Patent No. 6,472,127 (Takizawa) in view of U. S. Patent No. 6,136,514 (Phan et al., hereinafter referred to as Phan) as applied to claims 20-21, 23-25, 28, 31, and 34-35, above, and further in view of U. S. Patent 5,845,170 (Ogata).

Takizawa in view of Phan is discussed in paragraph no. 11.

Takizawa, in col 6, lines 10-56, in col 7, lines 1-24, discloses positioning the resist coated film substrate on a support plate in a developing unit, wherein the supporting plate (spin chuck) is rotatably driven by a motor, applying and displacing the surfactant and developer respectively on the surface of the resist while substrate is rotated, and developing the resist film by applying the developing solution for a predetermined time (reattachment of the developing solvent component to the surface of the photoresist film) (claim 26).

The difference between the claims and Takizawa in view of Phan is that Takizawa in view of Phan does not disclose that the resist-coated substrate is transferred to the developing unit. Takizawa does not disclose drying the substrate while rotating the spin chuck and transferring the substrate out of the developing unit (claim 27).

Ogata, in col 4, lines 57-67, in col 5, lines 30-37, in col 7, lines 61-67, discloses that the resist coated wafer is transferred to a developing unit. Ogata, in col 10, lines 6-36, discloses that after the developing process the wafer (rotated at a high speed) is rinsed, followed by drying, and then releasing the wafer from the developing unit (carry out the wafer, reference S19 of figure 8).

Therefore, it would be obvious to a skilled artisan to modify Takizawa in view of Phan by employing the resist coating and developing system suggested by Ogata because Ogata, in col 4, lines 56-67, in col 7, lines 61-66, and in figure 2, discloses that the resist coated substrate is transferred to a developing unit and are communicable with each other via a vertical flow system, thereby enabling an increased efficient cleanness of each part in the system.

10. Claims 29-30, 32-33, are rejected under 35 U.S.C. 103(a) as being unpatentable over U. S. patent No. 6,472,127 (Takizawa) in view of U. S. Patent No. 6,136,514 (Phan et al., hereinafter referred to as Phan) as applied to claims 20-21, 23-25, 28, 31, and 34-35 above, and further in view of U in view of U. S. Patent Application Publication No. 2004/0029026 (Hayasaki et al., hereinafter referred to as Hayasaki).

Takizawa is discussed in paragraph no. 6.

Takizawa, in col 6, lines 37-55, in col 7, lines 7-20, and in figure 12, discloses that the surfactant is spin coated via a nozzle onto the surface of the resist-coated substrate, followed by spin coating the developing solution (displacing the surfactant) via nozzle onto the surface of the rotating substrate (resist film treated with surfactant) wherein the developing solvent (of predetermined concentration, adjusted concentration) is sprayed in a circular manner (see figure 12) for a predetermined time so as to cause the developing solvent component to be reattached to the surface of the photoresist film (claims 29-30, and 32-33).

The difference between the claims and Takizawa in view of Phan is that Takizawa in view of Phan does not disclose that the nozzle used for dispensing either the surfactant or the developing solution includes a plurality of nozzles that dispenses the corresponding fluid in a substantially band shape, wherein the nozzles are scanned over the substrate while depositing the corresponding fluid.

Hayasaki, in [0056], [0057], [0058], [0061], [0065], [0068], [0069], and in figures 2, and 4, discloses the use of a rectangular shaped nozzle that includes a plurality of nozzle discharge ports and dispenses solutions (of predetermined concentration) in a band shape in a direction vertical (onto the surface of the substrate) to the nozzle scan direction.

Therefore, it would be obvious to a skilled artisan to modify Takizawa in view of Phan by employing a plurality of nozzles of the claimed geometry as suggested by Hayasaki because Hayasaki, in [0056], and [0057], discloses that such a nozzle arrangement enables a series of processes (treating, developing, cleaning etc) to be

performed, is moveable vertically and horizontally to discharge a fluid while scanning the substrate, and dispenses the fluid in a uniform amount on the surface of the substrate.

(10) Response to Argument

A)

I) Appellant argues that Takizawa describes the formation of a surfactant layer and not a surfactant solution layer.

The claim recites applying a surfactant containing liquid onto the resist film. Takizawa, in col 8, lines 25-27, discloses applying an aqueous solution of the surfactant onto the surface of the resist film i.e., an aqueous solution of the surfactant is a surfactant containing liquid, therefore the coating formed on the resist film is of a surfactant solution layer.

II) Appellant argues that Takizawa modifies the surface of the photoresist by forming a surfactant layer upon which the developing solution is applied and that the claimed invention invokes displacing the surfactant containing liquid.

Claim 1 recites applying a surfactant containing liquid onto the resist film and displacing the surfactant containing liquid film with a developing solution. Takizawa, in col 8, lines 25-27, discloses applying a surfactant solution (an aqueous solution of the surfactant) onto the resist film, in col 8, lines 30-45, discloses that a developing solution is applied onto the surfactant solution formed on the resist film and that reattachment of

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the developing solvent is moderated on the resist film i.e., the surfactant solution is displaced with the developing solvent that was applied. The claimed invention recites applying a surfactant solution onto the resist film i.e., for a given period of time the resist film is exposed within a distance of a molecular bond length to surface active agents (surfactant) that will temporarily or in that period of time form intermolecular bonds. Also, the claim recites displacing a "surfactant-containing liquid film" i.e., a bond exists in the surfactant containing liquid-resist film interface (intermolecular forces exist between the surfactant molecule and the resist film surface). Takizawa, in col 6, lines 44-45, discloses that the surfactant solution applied on the resist surface can be of monomolecular layer i.e., only an intermolecular force (a force weaker than a chemical bond) is formed between the surfactant monomolecular layer and that of the resist surface and Takizawa, in col 8, lines 35-47, discloses that the developing solution is reattached to the surface of the resist film i.e., the surfactant solution film is displaced.

III) Appellant argues that the claimed invention applies a surfactant containing liquid to the surface of the photoresist layer, and that the surfactant does not attach to the surface but rather remains in the solution.

The claim recites "displacing the surfactant-containing film". The limitation surfactant-containing film indicates the formation of a film i.e., a bond exists between the resist film surface and the surfactant molecule such that the surfactant molecules are attached to the surface of the resist film.

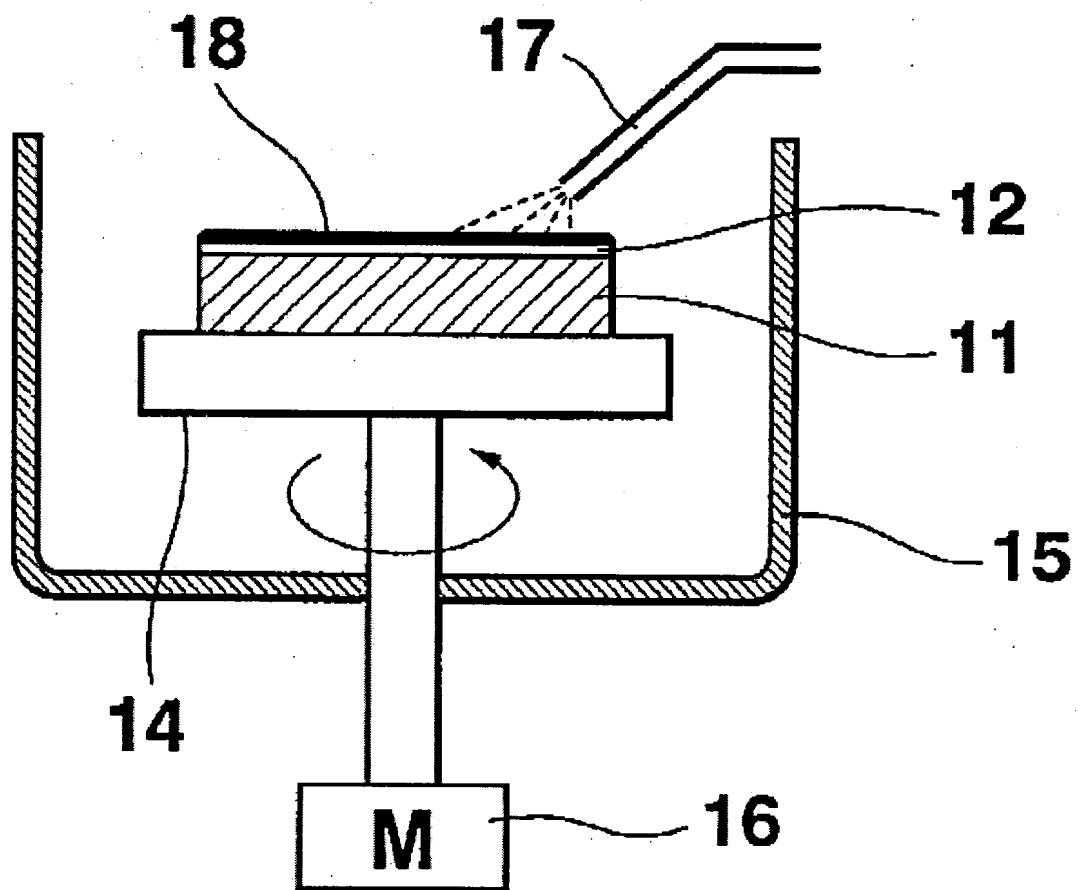
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IV) Appellant argues the claimed invention requires that the resultant layer of surfactant containing liquid to be displaced with a developing solution of selected concentration and that both the surfactant and the solvent are displaced by the developing liquid.

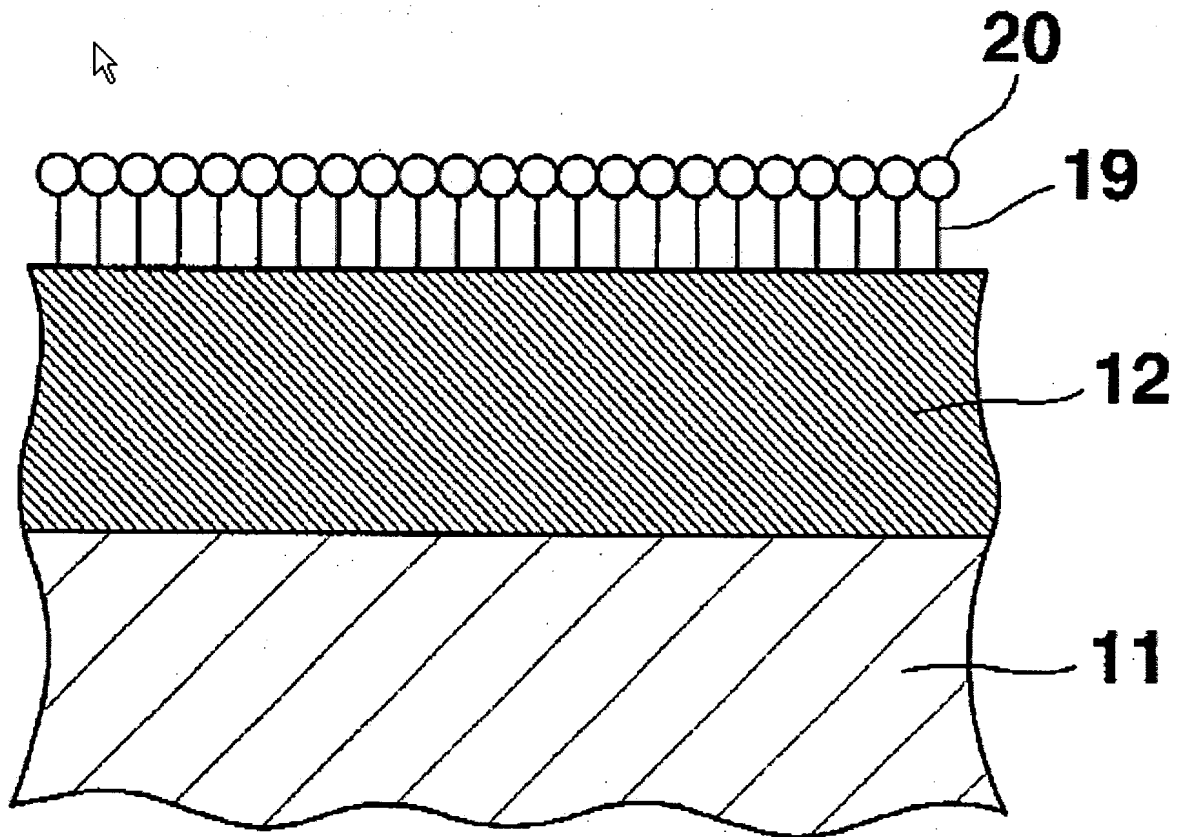
Takizawa, in col 6, lines 37-55, in col 7, lines 8-10, discloses that after applying the surfactant solution on the resist film, a developing solution is applied i.e., a developing solution of a known concentration, and that reattachment of the developing solvent component to the resist surface is moderated i.e., surfactant molecules in the monomolecular layer is displaced by the developing solvent. Additionally, the claims do not recite both the surfactant and the solvent being displaced by the developing liquid, the claim recites "displacing the surfactant-containing liquid film with a developing solution".

V) Appellant argues that Takizawa does not teach displacing the surfactant-containing liquid".

See arguments II), III) and IV) above. Takizawa , in col 6, lines 40-45, discloses the formation of the surfactant solution (reference 18) on the surface of the photoresist (reference 12) to form a monomolecular layer.



The monomolecular layer formed is inherently of intermolecular forces and is displaced by the developing solution applied on the surfactant solution layer (reference 18).



Takizawa, in col 6, lines 46-55, discloses that the during development i.e., applying developing solution onto the surface (reference 18 above; references 19, and 20 above are monomolecular films), reattachment of the developing solvent component to the resist surface (reference 12) is moderated i.e., the surfactant molecule is displaced with developing solution in order for a relaxed reattachment of the developing solvent on the resist surface (reference 12).

B)

I) Appellant argues that Takizawa teaches away from the claimed invention and from combining Takizawa with Phan et al., and that the combination fails to teach each and every element of the claims.

Takizawa does not teach away from the claimed invention. Both Takizawa and Phan teach applying a solution of a surfactant onto the surface of the resist layer prior to applying a developing solution. Therefore, Takizawa does not teach away from the invention. Also Phan is not depended upon to teach each and every element of the claims.

II) Appellant argues Takizawa treats the photoresist layer with an aqueous solution of a surfactant to form a surfactant layer that remains on the surface to modify the surface properties (Abstract).

The Abstract of Takizawa states,

In order to decrease a development defects even when the blocking level of a chemically amplified photoresist is increased, according to a disclosed photoresist pattern forming method, a photoresist film (12) made of a chemically amplified photoresist is applied to a semiconductor substrate (11), and after that, before a developing process, an aqueous solution of a surfactant containing a hydrophilic group is applied to the photoresist film (12), so that a surfactant layer (18) is formed.

The abstract above, does not state that the surfactant layer remains on the surface to modify the surface properties. Also, see argument V) of A).

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III) Appellant argues that Takizawa teaches away from a method in which the surfactant is removed i.e., displaced, from the surface by the subsequently applied developing process, and that Phan does not teach the claimed displacement.

Takizawa, in col 6, lines 46-55, discloses that the during development i.e., applying developing solution onto the surface of the surfactant layer, reattachment of the developing solvent component to the resist surface is moderated i.e., the surfactant molecule is displaced with developing solution in order for a relaxed reattachment of the developing solvent on the resist surface. Therefore Takizawa does not teach away from the claimed method. Additionally, Phan is not depended upon to disclose the displacement of the surfactant solution layer with a development solution.

IV) Appellant argues that Takizawa does not teach determining the concentration of the surfactant solution, and that there is no motivation to combine the teachings of Takizawa and Phan, and thus teach away from combining the disclosure of Phan.

Takizawa, in col 9, lines 45, in col 10, lines 20, and 58, and in col 11, line 9, teaches the claimed surfactant (recited in claim 3). Takizawa teaches the use of a solution of a surfactant i.e., a certain concentration of the surfactant is present in the solution. Takizawa is not depended upon to disclose the process of determining the concentration of the surfactant. Phan, in col 2, lines 22-25, in col 3, lines 28-67, discloses the process of determining the concentration of the surfactant in a solution based on resist film properties. Also, the motivation to combine Takizawa with Phan is that Phan in col 3, lines 27-67, discloses that the surfactant containing solution i.e., the resist activating solution promotes a reduction in the surface tension of the developer,

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promotes the wetting of the surface of the resist etc. Additionally, Takizawa, in col 6, lines 49-50, also teaches that the surfactant causes the surface of the photoresist film to be hydrophilic i.e., promoting the wettability of the resist surface, and Phan in col 3, lines 46-57, discloses determining the concentration of the surfactant in order to promote wettability of the surface of the resist surface. Therefore, Takizawa does not teach away from combining the disclosure of Phan.

V) Appellant argues that Phan does not teach that the range of concentration is based on one or more characteristics of the resist film.

Phan, in col 3, lines 28-67, and in col 4, lines 1-7, discloses different concentrations of the surfactant utilized, and that the resist activating solution is prepared with a certain amount of surfactant by taking into account resist film characteristics such as surface wetting properties of the resist film (hydrophilic or hydrophobic).

C)

I) Appellant argues that Ogata does not teach Appellant's requirement that the resultant layer of surfactant containing liquid is displaced with a developing solution of selected concentration.

Ogata is not depended upon to disclose the displacement of the layer of surfactant containing liquid with a developing solution of a selected concentration. See argument V) of A), and III) and IV) of B).

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D)

I) Appellant argues that Hayasaki does not teach Appellant's requirement that the resultant layer of surfactant containing liquid is displaced with a developing solution of selected concentration as stated in claim 1, and therefore Takizawa and Hayasaki do not teach all the elements of claims 12-13, and 15-16.

Hayasaki is not depended upon to disclose the displacement of the layer of surfactant containing liquid with a developing solution of a selected concentration. See argument V) of A), and III) and IV) of B). Also, see paragraph 6, of the Grounds of Rejection.

E)

I) Appellant argues that Takizawa and Phan does not disclose Appellant's requirement that the resultant layer of surfactant containing liquid is displaced with a developing solution of selected concentration as stated in claim 20, and therefore either alone or in combination Takizawa in view of Phan does not teach all the elements of claims 20, 21, 23-25, 28, 31, and 34-35.

Takizawa, in col 6, lines 46-55, discloses that the during development i.e., applying developing solution onto the surface of the surfactant layer, reattachment of the developing solvent component to the resist surface is moderated i.e., the surfactant molecule is displaced with developing solution in order for a relaxed reattachment of the developing solvent on the resist surface. Therefore Takizawa does teach displacing the surfactant layer with a developing solution. Additionally, Phan is not depended upon to disclose the displacement of the surfactant solution layer with a development solution.

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Phan, in col 2, lines 22-25, in col 3, lines 28-67, discloses the process of determining the concentration of the surfactant in a solution based on resist film properties. Also see paragraph 7, of the Grounds of Rejection.

F)

I) Appellant argues that neither Takizawa nor Phan teaches the resist layer thickness being a variable to consider for determining the concentration of the surfactant solution, and that Phan teaches that the thickness of the resist is not critical to the invention (Col 3, lines 11-12), and thus Takizawa and Phan cannot be combined with the teachings of Maemori.

Neither Takizawa nor Phan is depended upon to disclose determining the concentration of the surfactant solution based on the thickness of the resist film. Maemori is depended upon to disclose taking in to consideration the surfactant concentration based on the resist film thickness. The citation of Phan, Col 3,

a 193 nm sensitive photoresist, an I-line, H-line, G-line, E-line, mid UV, deep UV, extreme UV or chemically amplified photoresist material may be spin-coated on the substrate surface. Positive or negative photoresists may be used, but positive photoresists are preferred. Photoresists are commercially available from a number of sources, including Shipley Company, Kodak, Hoechst Celanese Corporation, Clariant, JSR Microelectronics, Hunt, Arch Chemical, Aquamer, and Brewer. The resist is typically applied to any suitable thickness, typically from about 200 Å to about 10,000 Å, although the thickness of the resist is not critical to the invention.

lines 11-12, does not relate to determining the surfactant concentration based on resist thickness. The citation above clearly discloses a range of resist thickness applicable in

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an invention, wherein the range of resist thickness is not limited to a particular value.

Therefore, Phan does not teach away from Maemori. Also, see paragraph no. 8 of the Grounds of Rejection.

G)

I) Appellant argues that Takizawa, Phan and Ogata do not teach Appellant's requirement that the resultant layer of surfactant containing liquid is displaced with a developing solution of selected concentration as stated in claim 20, and therefore Takizawa, Phan and Ogata do not teach all the elements of claims 26-27.

Ogata is not depended upon to disclose the displacement of the layer of surfactant containing liquid with a developing solution of a selected concentration. See argument V) of A), and III) and IV) of B). Also, see paragraph 9, of the Grounds of Rejection.

H)

I) Appellant argues that Takizawa, Phan and Hayasaki do not teach Appellant's requirement that the resultant layer of surfactant containing liquid is displaced with a developing solution of selected concentration as stated in claim 20, and therefore Takizawa, Phan and Hayasaki do not teach all the elements of claims 29-30, and 32-33.

Hayasaki is not depended upon to disclose the displacement of the layer of surfactant containing liquid with a developing solution of a selected concentration. See argument V) of A), and III) and IV) of B). Also, see paragraph 10, of the Grounds of Rejection.

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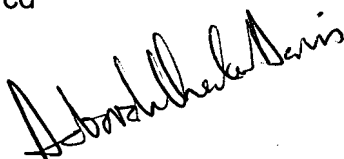
(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

dcd

A handwritten signature in black ink, appearing to read "Romulo Delmendo", is written over the typed name.

Conferees:

/Romulo Delmendo/

Romulo Delmendo, Appeals Specialist

/Mark F. Huff/

Mark F. Huff, SPE 1756